PROCEEDINGS OF THE BIOLOGICAL SOCIETY OF WASHINGTON
109(2):248–255. 1996.

A new genus and species of ampharetid polychaete from deep-sea hydrothermal vent community in the Azores triple-junction area

Daniel Desbruyères and Lucien Laubier

(DD) Département Environnement Profond, Centre de Brest de l'IFREMER, B.P. 70, 29280 Plouzané, France;
(LL) Laboratoire de Physiologie des Êtres marins, Institut Océanographique, 195 rue Saint Jacques, 75005 Paris, France

Abstract.—*Amathys lutzi,* a new genus and species of Ampharetinae (Polychaeta: Ampharetidae), is described from active hydrothermal vents on the Lucky Strike segment, close to the Azores triple-junction area of the Mid-Atlantic Ridge. It is found in the same micro-habitat than *Amphisamytha galapagensis* Zottoli, 1983. It differs from all previously known Ampharetinae by the number (17) of thoracic uncinigerous segments.

In 1993, the Lucky Strike expedition (cruise *Atlantis II* 129-6) visited an active hydrothermal field situated at 37°17.538′N and 32°16.490′W in 1626 m. The expedition consisted of six dives of the DSRV *Alvin* and aimed to find and describe active hydrothermal sites and the biological communities associated with venting areas. Based on this first exploration, the *Diva 2* expedition (1994) completed 24 dives of the submersible *Nautile* on the same hydrothermal area. Hydrothermal activity occurs around a lava lake situated in the depression between three cones which form the summit of a seamount, at the center of a long broad ridge segment that extends from 37°00′N to 37°35′N; hydrothermal activity includes flanges with pool temperature ≤200°C to black smokers venting fluids as hot as 333°C (Langmuir et al., 1993, pers. obs.). The dominant organisms in these hydrothermal fields are populations of a new species of mussel (bathymodiolid) that colonizes hydrothermal sulfide edifices and their vicinity. Other less conspicuous components of the fauna include new species of alvinocarid shrimps, peracaridan crustaceans, bythograeid crabs, sea-urchins and several species of polychaetes including a polynoid commensal of mussels (Van Dover et al. 1993). Ampharetid polychaetes were sorted from mussel washings, or found in tubes attached to mussel shell hinges and to sulfide or basaltic rocks.

Materials and Methods

The specimens were collected using *Alvin* and *Nautile* manipulators. The samples were brought to the surface inside insulated boxes and were washed and sieved through a 250-μm mesh. They were sorted partially aboard the mother-vessels, then fixed in buffered formalin and preserved in 80% ethanol after a one day fixation. In the laboratory, specimens are dehydrated to ethyl alcohol absolute, critical point dried, put on stubs and coated with gold. Finally, the specimens were examined using a Philips XL 30 scanning electron microscope.

Order Terebellida
Family Ampharetidae Malmgren, 1865
Subfamily Ampharetinae Chamberlin, 1919

Amathys, new genus

Diagnosis.—Thorax with 20 setigerous segments, of which the last 17 are uncinigerous. Abdomen tapering rapidly with 16–20 uncinigerous segments, no notopodial or

neuropodial cirri or vestigial abdominal notopodia. Notopodia of the first setigerous segment reduced. Four pairs of smooth branchiae. A buccal ciliated membrane bearing dorsally clavate and grooved tentacles. Anus terminal without cirri. No modified segment.

Genus.—Amathys

Type species.—Amathys lutzi

Etymology.—Amathys is an anagram of *Samytha.* Gender is male.

Remarks.—This genus differs from all known genera of Ampharetinae by having 17 uncinigerous thoracic segments.

Amathys lutzi, new species
Figs. 1, 2, 3

Etymology.—This species is dedicated to Dr. Richard A. Lutz from Rutgers University, New Jersey, USA in an attempt to express our friendly thanks for several opportunities that he gave us to dive with the DSRV *Alvin* in several Eastern Pacific hydrothermal vent areas.

Material.—Lucky Strike expedition: dive *Alvin* 2606, 1 June 1993 (M. Tivey, L. Saldanha, observers): 5 specimens, dive *Alvin* 2607, 2 June 1993 (C. Van Dover, T. Emerson, observers): 1 specimen. *Diva 2* expedition: dive *Nautile* 912/40-01, 3 June 1994 (A.M. Alayse, observer): 1 specimen; dive *Nautile* 913/41-02, 4 June 1994 (P. Crassous, observer): 15 specimens; dive *Nautile* 915/43-04, 6 June 1994 (D. Desbruyères, observer): 2 specimens (including holotype); dive *Nautile* 916/44-05, 7 June 1994 (F. Barriga, observer): 117 specimens; dive *Nautile* 917/45-06, 8 June 1994 (L. Saldanha, observer): 45 specimens. All specimens from different vent sites within the Lucky Strike area (latitude from 37°17,25′ to 37°17,63′N, longitude from 32°16,50′ to 32°16,90′W, depth from 1622 to 1725 m). All specimens from washings of mussel clumps or tubes attached to mussel shells and sulfide or basaltic rocks. Holotype (USNM 170025), Paratypes (MNHN, Paris, UD 851/A928).

Description.—Body whitish, without color pattern when preserved. Holotype complete, about 14.8 mm in length and 4.3 mm in greatest width, with 38 setigerous segments. Size of paratypes from 1.25 mm to 15.7 mm in length and from 0.25 mm to 4.4 mm in width. Paratype used for SEM observations complete, 6 mm long and 2.1 mm wide. Prostomium indistinctly trilobed, lacking glandular ridges and eye spots but bearing two transversal nuchal slits underlined by secretions and mineral particles (Fig. 2a). Buccal tentacles smooth, entire, clavate, grooved and ciliated (Fig. 2b), inserted on the latero-dorsal part of a folded "feeding" membrane heavily ciliated (Fig. 2c) and sprinkled with organic and mineral aggregates. First two segments (I and II according to Day 1964) achaetous and fused, forming the lower lip. Segment III lacking palae. Thorax with twenty setigerous segments, the last seventeen being uncinigerous. The first setiger, segment IV, with a vestigial notopodium and reduced bundles of capillary setae. Four pairs of smooth, cylindrical branchiae on dorsal surface of segments III-VI, all similar, regularly attenuated. Branchial length about ¼ of the body length in preserved specimens. Branchiophores short and not fused. Small mid-dorsal gap between the two branchial groups but no web. The two outer branchiophores inserted between segments III and IV, the two inner branchiophores in segments V and VI. Notopodia increasing in size from setigerous segments 2 to 5. Notopodium cylindrico-conical, slightly flattened anterio-posteriorly with two series of winged capillary setae (one short, the other approximately 250 μm long). Notosetae capillary slightly unilimbated, covered with continuous layer of minute spinelets when viewed under scanning electron microscope (Fig. 3a, b). Neuropodial lobes (uncinigerous pinnules) from setiger 4, each with a single row of toothed uncini, tips oriented forward (23–30 uncini per row). 17 uncinigerous tori on thoracic segments and 16–20 uncinigerous pinnules on abdominal segments. Thoracic

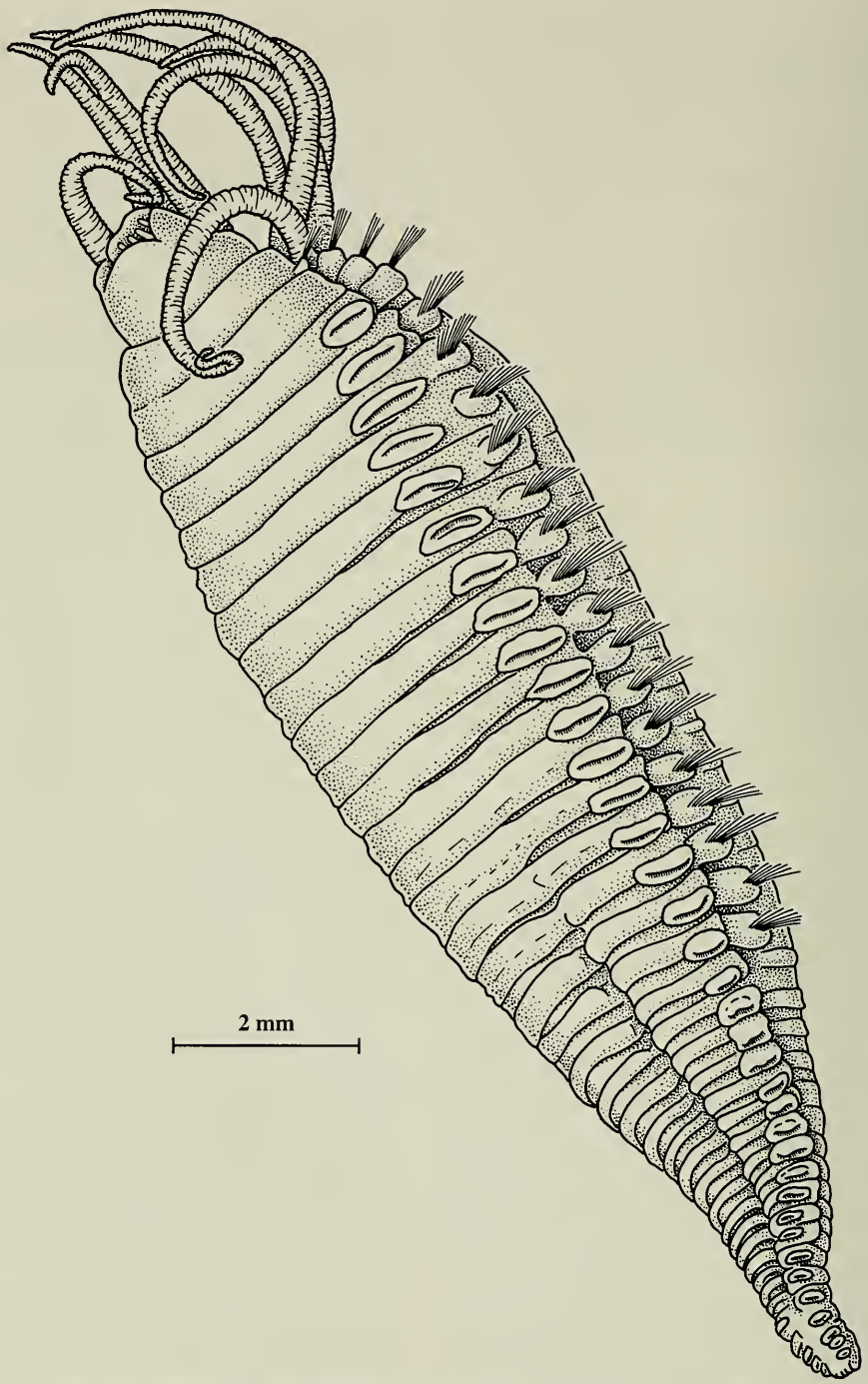

Fig. 1. *Amathys lutzi,* new genus, new species. Entire animal (holotype) in ventro-lateral view.

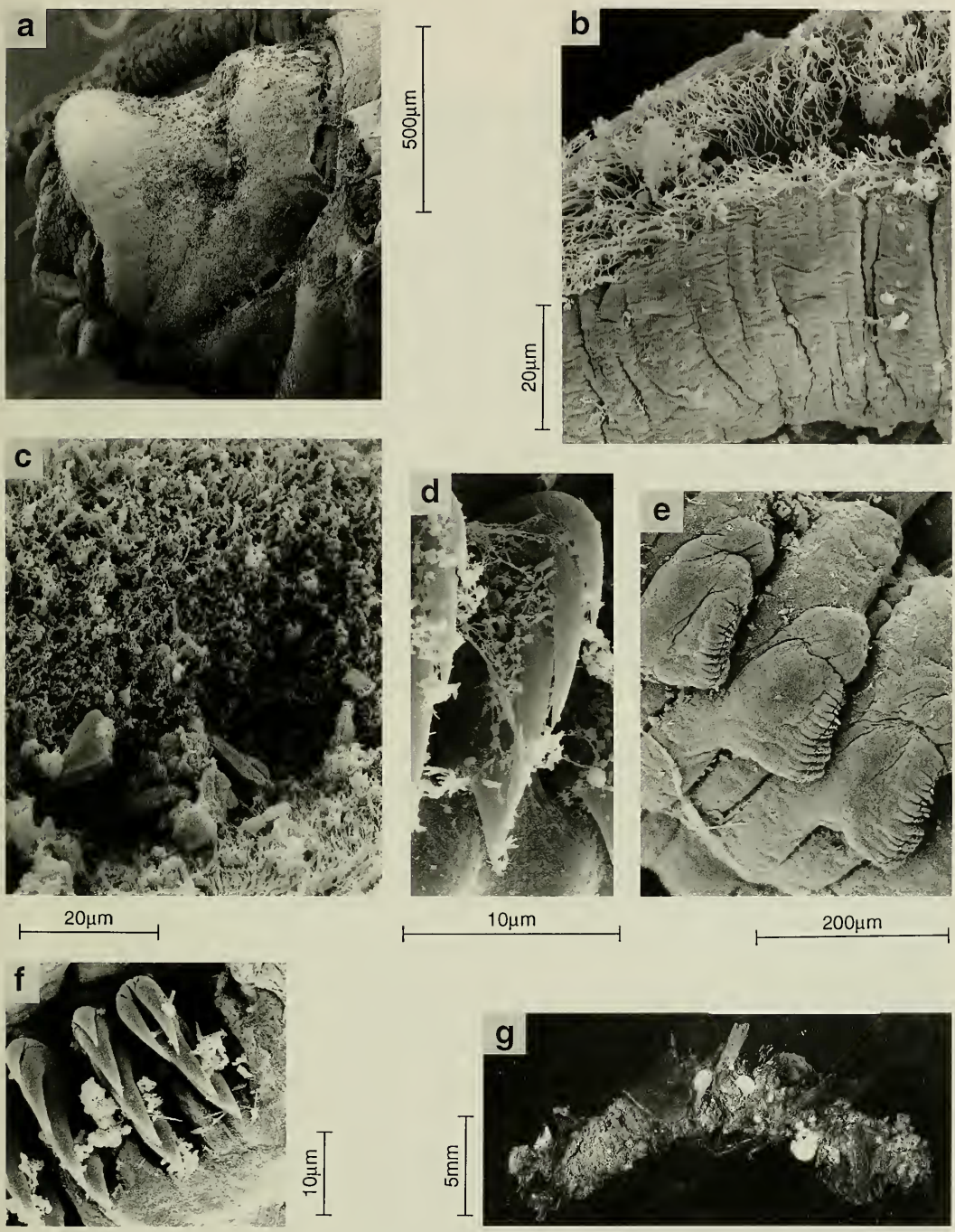

Fig. 2. *Amathys lutzi,* new genus, new species. a, prostomium in dorso-lateral view (left side). b, ciliated groove of a buccal tentacle. c, detail of the ciliated surface of the fold, buccal membrane sprinkled with organic and mineral aggregates. d, thoracic uncinus in lateral view. e, abdominal parapodia in ventro lateral view (left side of the body). f, thoracic uncini with a duplication of the upper tooth. g, tube.

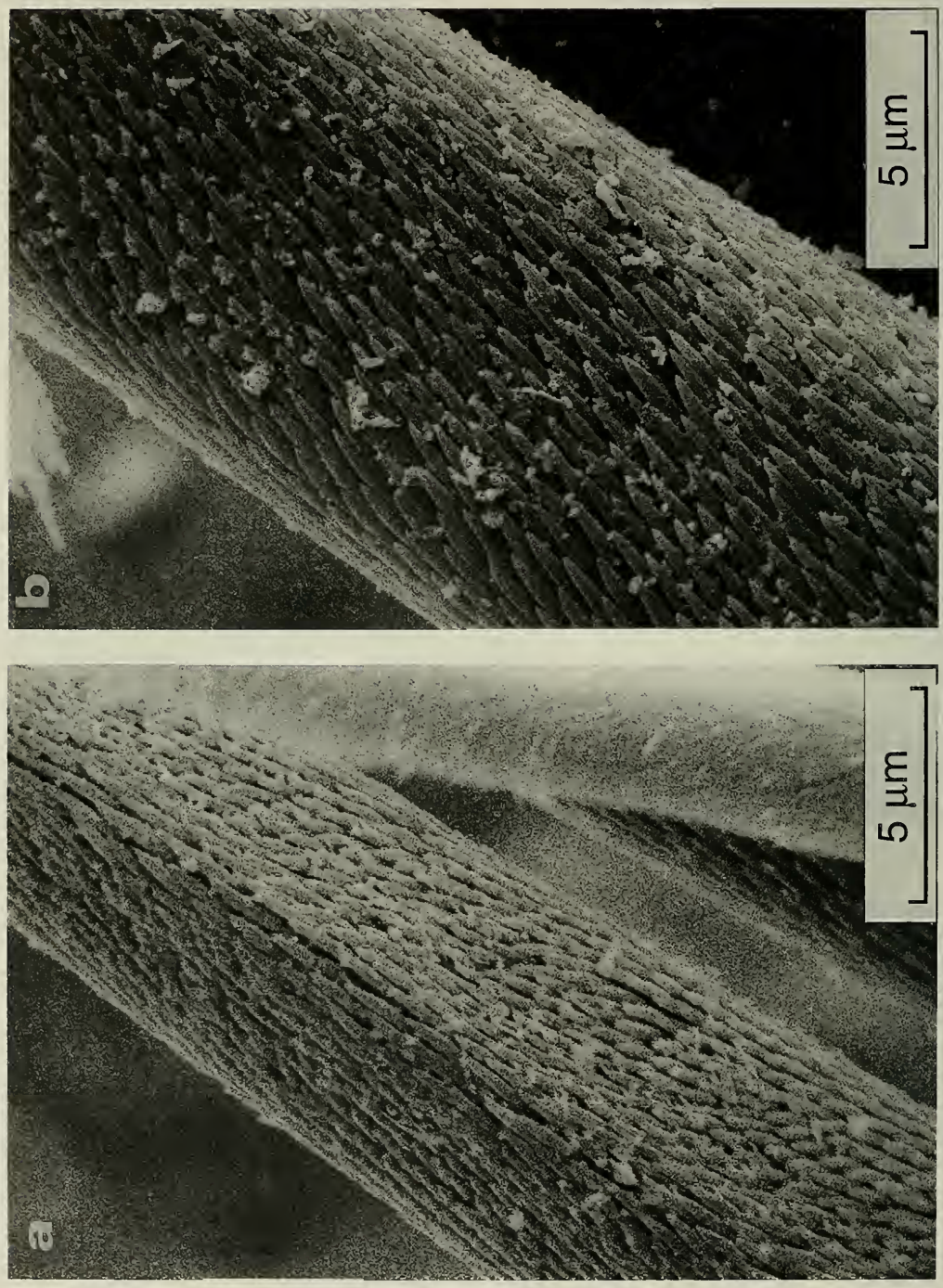

Fig. 3. *Amathys lutzi*, new genus, new species. SEM microphotographs of a thoracic capillary setae. a, distal part of a setae. b, proximal part of the same.

parapodia without cirri. Each thoracic uncinus with a single row of four teeth (Fig. 2d), the upper ones, sometimes but seldom, laterally duplicated (Fig. 2f). Abdominal uncini with same shape and size as thoracic ones. Small teeth present at the base of the main ones laterally on thoracic and abdominal uncini. A rounded glandular pad above each abdominal uncinigerous pinnule (Fig. 2e). Abdominal notopodial lobes absent. Abdomen short (one-third of the body length). Pygidium terminal without circle of papillae or anal cirri. No indication of sexually mature specimens.

Tube.—Mucus lined tubes covered with rusty colored mineral particles, agglomerated with mussel periostracum or byssal threat fragments as well as pieces of gastropod shells; about three times worm length (Fig. 2g). Sometimes, tube simple covered with gray mud.

Discussion.—The morphology of this species is reminiscent of that of *Amphisamytha galapagensis* Zottoli, 1983 and that of *Amphisamytha fauchaldi* Solis-Weiss & Hernández-Alcántara 1994, both found within the Pacific hydrothermal vent environment. In the Atlantic Ocean, McHugh & Tunnicliffe (1994) report, the presence of *Amphisamytha galapagensis* listed as "Ampharetidae gen. sp." by Segonzac (Segonzac 1992); we do not agree with this assumption and we here confirm, after discussion with M. Segonzac, that all specimens (including Segonzac's specimens) from both Snake Pit (M.A.R., 23°20′N) and Broken Spur (M.A.R., 29°10′N) vent fields were damaged and macerated and that their bad shape doesn't allow determination, even at the generic level.

Amathys lutzi, new species, clearly belongs to a group of species having in common a ciliated buccal membrane, grooved ciliated or entire clavate buccal tentacles, no palae, reduced setation on segment IV. This group gathers species having three or four pairs of branchiae, different numbers of thoracic uncinigerous segments, one or two rows of teeth on the thoracic unicini. This collective group gathers together *Amphisamytha galapagensis* Zottoli, 1983, *Amphisamytha fauchaldi* Solis-Weiss & Hernández-Alcántara, 1994, *Amythas membranifera* Benham, 1921 and *Samytha californiensis* Hartman, 1969. *A. lutzi* differs from them by the presence of 17 uncinigerous thoracic segments instead of 14 in *A. galapagensis* and *A. fauchaldi* and the shape of abdominal uncini of the anal part in the former species (Zottoli 1983). This high number of uncinigerous thoracic segments is unusual among Ampharetinae; until the present work it varied within the subfamily from a minimum of 9 (*Mugga* and *Egamella*) to a maximum of 15 (*Weddellia*). Since Day's (1964) revision, the number of thoracic uncinigerous segments has been used by taxonomists as a character that is consistent at the generic level.

Day's revision was justified by the high number of genera (27) and the difficulty of the recognition of genera. Day (1964) proposed to use the number of gills, the number of thoracic uncinigerous segments, the presence of a glandular ridge on the prostomium and the presence of notopodial cirri as generic characters. Since then, 24 new genera were described, all of them still remaining monospecific (see Holthe 1986 for review, Jirkov 1986, Solis-Weiss 1993). In 1979, using multivariable analysis on a phenetical matrix based on Day's taxonomic characters, Chardy & Desbruyères (1979) demonstrated that these characters are only discriminant among a few major shallow water genera like *Amphicteis, Ampharete, Amage* or *Anobothrus* but that they are poorly discriminant in the case of most of the abyssal species which look as a continuum when using Day's characters. Whatever should be the present generic clustering for Ampharetid species, it suffers deeply from the history of sampling which started in shallow waters where evolutive radiation is limited to a few rather well defined genera. Sampling of the deep-sea benthos, which increased rapidly since the Challenger expedition, brought numerous

new forms whose morphological patterns do not fall inside the shallow water model variations. In deep-sea species, the different generic characters as cited above evolve independently, thus leading to a continuum of species where generic patterns are difficult to recognize either by aggregation or by dichotomy (Chardy & Desbruyères op. cit.). Unfortunately, most of the new taxa were described on the basis of unique specimens that were often truncated and sometimes damaged during recovery of samples and sieving of abyssal sediment, which led to a difficult situation in the scope of a new revision.

In his recent work on Terebellomorpha, Holthe (1986) proposed to gather *Samytha, Samythella, Eusamytha, Amythas, Demunciger* and *Alkmaria* in a new tribe named *Samythini* for Ampharetinae with tentacles smooth, no glandular ridge in the prostomium. Most of these genera have a rather developed buccal membrane as does *Amathys lutzi.* Surprisingly, Holthe placed *Amphisamytha* among "Ampharetinae with uncertain tribal affinities" when the diagnosis of this genus fits well with the characteristics of the tribus *Samythini.* I propose here to include *Amphisamytha* and *Amathys* inside *Samithini.*

The erection of the new genus *Amathys* is a conservative position which takes into account the classical taxonomic characters as displayed in Day's revision (1964). In that context, the erection of a new genus is fully justified, but, as mentioned by Holthe (1986), ". . . when all genera become monotypic, the generic category has become void of information." Full phylogenetic analyses of morphological and molecular characters may lead to major generic revisions of the Ampharetinae in future.

Acknowledgments

We thank Philippe Crassous (scanning electron microscope) and Violaine Martin (drawings) for technical assistance, Patrick Briand (CENTOB) for sorting specimens and Dr. C. Langmuir, chief scientist of the Lucky Strike expedition, who kindly invited one of us (DD) to participate to the cruise and to dive with the DSRV *Alvin.*

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